Droplets and Downpours

Summary
Participants sketch a landscape design map of their yard or the study site. By doing three experiential activities, participants learn how stormwater flows through different habitats/landscapes and ultimately how to prevent erosion and other nonpoint sources of pollution. First participants roll wet tennis balls (simulated rain drops) down hill through different landscapes (road/path, lawn, forested/vegetated area) to discover what landscapes slow the flow of rainwater the best and what pollutants a water droplet may pick up. Using a watering bottle, they observe erosion in different habitats. Next participants compare the runoff from a newly raked area with a naturally mulched area to discover the value of duff or "natures mulch" (leaves, twigs pine needles often found in forested areas). Finally students each create a sandcastle that they hope will withstand a downpour. Participants revisit their landscape design to add arrows to depict the flow of stormwater. Then they sketch in improvements that will divert stormwater away from the nearby waterbody to protect water quality.

Time: 45 -60 minutes not including pre and post activities.

Grade level: 4-8
Maine Learning Results: Science and Technology
B. Ecology -5. Describe various mechanisms found in the natural world for transporting non-living matter and the results of such movements.
M. Implications -4. Describe an individual's impact on an environmental system.
7. Explain the connections between natural resources, population and economic development.

Location: A Sloping area outside that has a variety of habitats or landscapes- vegetation with natural duff, lawn, gravel path or road, bare soil. A sand box or beach area.

Materials:
Rake, one old tennis ball for each participant, Rainmaker- watering can or 2 liter bottles with about 8-12 holes drilled in the neck area, about 12 liters of water in 2 liter bottles, bucket, pictures of eroded areas and local laws (Soil Campaign postcards, Waterfront Brochure, info on NPS), sandy area for making sand castles, touch box or bag with soil

Pre activity: (optional but could be a great assessment tool)
Have participants draw the elements of a landscape, either the school yard or their own back yard. Include the location of buildings and their gutters, paved areas, paths, gravel areas, parking areas, lawn, trees, shrubs, bear soil, streams, drainage ditches, and stormdrains. Also include location of hills. Doing this first as a class in a small portion of the school yard may be helpful.

Procedure:
Activity 1 Evaluating Different Landscapes. A wet tennis ball is used to simulate a rain drop. Ask, "When it rains where does the water go?" (Down hill, into the ground, stays in a puddle) When it hits the ground and runs downhill it is called stormwater. Each participant rolls not throw a clean, wet tennis ball down hill. Demonstrate rolling the ball. It is important to use the same force each time. It is best to roll the balls one at a time. Have each participant measure the distance their ball rolled using their feet as a measuring device. Note obstacles the water droplet (tennis ball) encounters and what, if any, items have become attached to the ball. Repeat this ball rolling activity on lawn, forest or whatever habitat is available. Have the participants fill out the "Droplets and Downpours" worksheet for each habitat. Gather together and discuss results. If

needed use a 2 liter watering bottle to demonstrate and observe stormwater. Have participants answer questions individually and then discuss answers as a group.

Activity 2 The Value of Duff
Go back to the naturally forested area observe the components of duff (leaves, twigs pine needles often found in forested areas). Why do people rake up duff? (They think it looks neat -- a cultural belief.) Rake up duff in a small sloped area. Use the 2 liter bottle to rain on the unraked duff area and the raked duff area. Observe and record what happens. (They should observe erosion on the raked up area.) The message you want to convey is that it is best to just leave the duff. It is less work and it is better for the waterbody.

Overview brochure Waterfront Property = Responsible Ownership or any local ordinances to protect water quality. There are many other laws to protect waterbodys, rivers and ocean. Mention that there are local laws relating to erosion and clearing of vegetation in the shoreland zone. For Example, The Maine Sedimentation and Erosion Control Law requires erosion control practices to prevent any soil from leaving a construction site. In 2005 all sites in Priority Watersheds that have eroding soil must be stabilized. By 2010, all eroding sites in the State of Maine must be stabilized. Ask the participants which drawing is best for protecting water quality. They should choose the picture of the vegetated buffer.

Show pictures of eroded areas and/or the soil campaign postcards. Ask what they see. Discuss any other erosion control practices that pertain to the location.

Have some soil in a touch box or paper bag. Ask the students to think to themselves the answer to this question: "What is the number one pollutant to water?"
Then have them each reach in and feel the soil to confirm their answers.

Ask, "What can you do to protect your waterbody?"

Activity 3 Sand Castle Contest
Delineate an area where students can make sand castles that can withstand a downpour from the rainmaker. Encourage students to use erosion control by gathering debris to stabilize the sand and to simulate vegetation and duff. When they are finished or the time is up, make it rain on each sand castle and discuss the results. Be sure to encourage the students to extrapolate to the real world. What types of landscapes are good? How does development effect stormwater runoff and pollution of the water?

Post activities:
Review the landscape design and add arrows to show the flow of stormwater in their backyards or the schoolyard. Using these arrows, decide where to add more plants or water diversion features.

Follow up with a buffer planting activity or make "Plant a Buffer" T-shirts.

Name _____

Droplets & Downpours

	Lawn	Road or path	Buffer forest
My ball traveled			
My ball picked up			

1) Which habitat has the most obstacles that slowed the ball?
   _____
2) In which habitat did the ball move faster and/or farther along the surface? _____
3) What pollutants could stormwater (rainwater) pick up?
   _____
   _____
4) In which habitat would water drops or stormwater pick up the most pollution? _____
5) Which habitat is best to protect the lake from stormwater? Why?
   _____
   _____
6) What can you do to protect the lake water? _____
   _____
   _____
   _____
   _____